Section 3. EGS Description

The EOS Ground System (EGS) is an operational assembly of facilities, networks, and systems which collectively comprise the infrastructure necessary to acquire, transport, archive, process, distribute, and organize EOS and other NASA Earth science data and make these data accessible to the broad science/user community. The EGS comprises the following:

a. EOS program-specific components and capabilities called the EOSDIS

b. Institutional facilities that provide services to multiple missions simultaneously, and

c. Other participating programs that are not solely dedicated to the EOS program.

This section describes these components that comprise the EGS in more detail, with primary emphasis placed on describing the role of the EOSDIS. Figure 3-1 presents an overview of the EGS with components of the EOSDIS depicted as shaded. A more detailed view of the hardware and software components, and the communications infrastructure of the EGS is presented in the *EOS Ground System Architecture Description Document.*

3.1 EOSDIS

3.1.1 EOSDIS Description

The EOSDIS serves as NASA's MTPE science data system for information management, data processing, archival, and distribution of NASA Earth science data. It provides computing and network facilities to support the EOS research activities, including data interpretation and modeling; EOS data processing, distribution, and archiving; and planning, scheduling, monitoring, and control of the spacecraft and instruments. The EOSDIS also provides access to current and upcoming non-EOS Earth science data sets through the Version 0 working prototype system; Version 0 is discussed in Section 3.1.4.3. Figure 3-1 depicts the EOSDIS components within the EGS as shaded.

3.1.2 EOSDIS Goals and Objectives

To support achievement of the MTPE Program’s mission objectives, the EOSDIS will

a. Provide a unified and simplified means for obtaining and manipulating Earth science data.

b. Provide prompt access to all levels of data and documentation concerning the processing algorithms and validation of the data, and to data sets and documentation that result from research and analyses conducted using the data provided by EOS.

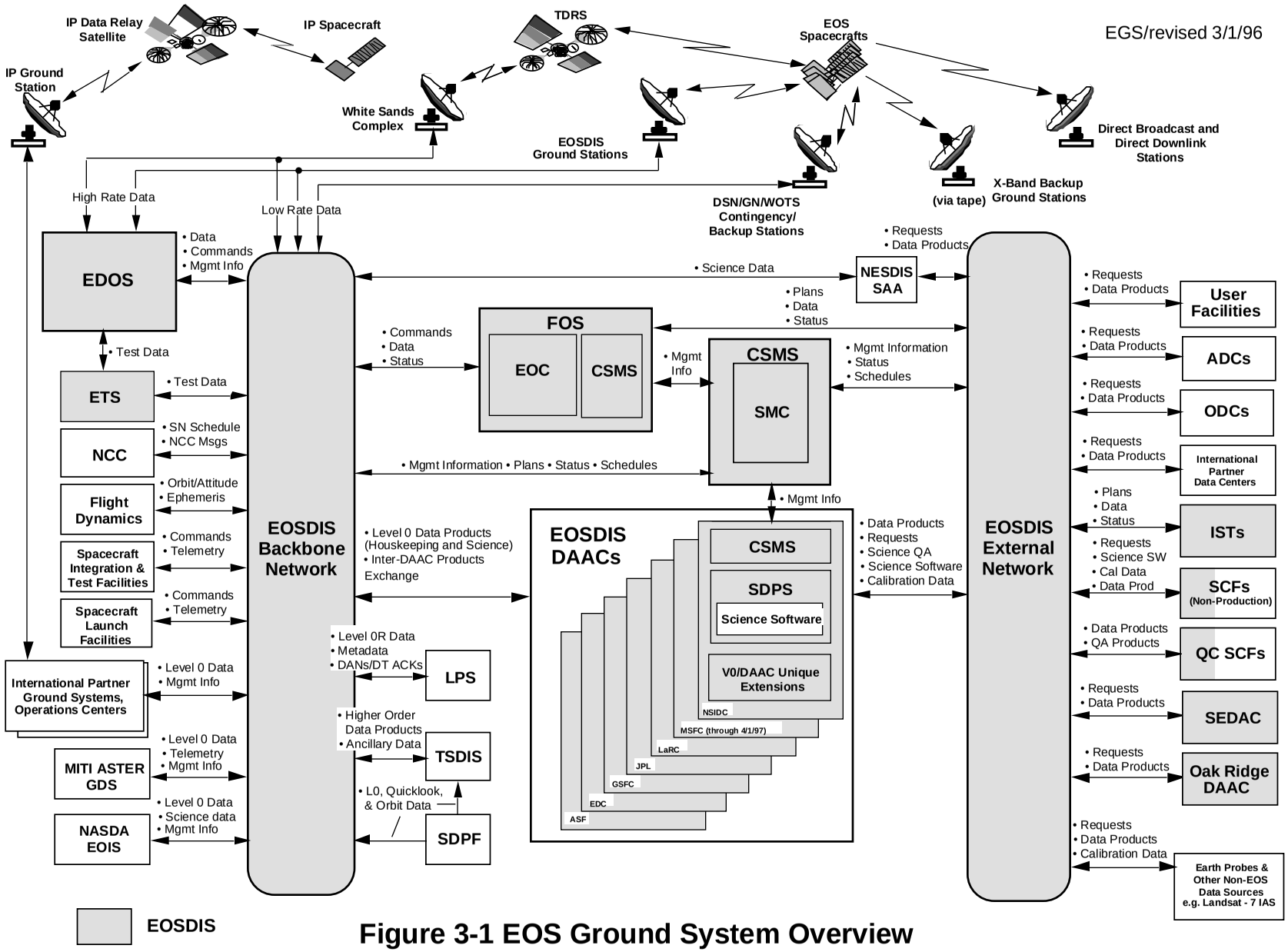

Figure 3-1 EOS Ground System Overview

c. Provide capabilities for a distributed community of Earth scientists to interact with data sources and mission operations from their own facilities.

d. Be responsive to user needs.

e. Facilitate evolution, growth and adaptation to new sources of data and new data system technologies.

f. Perform command and control of the EOS instruments and spacecraft.

3.1.3 Key EOSDIS Requirements

The EOSDIS is a comprehensive data and information system that must perform a wide variety of functions, supporting a diverse national and international user community. EOS data products will be used by a wide spectrum of scientists and the general public throughout the extended life of the program and in the decades to follow. This commitment to provide a long-term data base of usable scientific information to the various user communities distinguishes EOSDIS from current remote sensing data systems.

The key requirements to be met by EOSDIS are

a. Perform planning, scheduling, command, and control functions for all the EOS spacecraft and the instruments on-board such spacecraft,

b. Capture the data from all EOS spacecraft and process these data to create level 0 data products (i.e., raw data as measured by the instruments),

c. Support the generation of higher level (levels 1 - 4) standard products and special products,

d. Archive and manage all the standard and special products generated from the EOS instruments during the mission life, and distribute (or provide access to) requested subsets of the products to users either electronically or on appropriate media. In addition, archive and distribute data from other sources that are part of the MPTE,

e. Provide convenient, user friendly mechanisms for locating and accessing subsets of products of interest; facilitate collaborative science by providing tools and capabilities to provide users access from their own facilities,

f. Provide comprehensive user support to aid users with a wide variety of needs and applications in identifying, locating, and using the data for their applications,

g. Accommodate system changes as technology and user requirements evolve,

h. Provide an open architecture that facilitates the introduction of new technologies and system expansion to provide new services and capabilities, and

i. Transfer the control of data held by EOSDIS to long-term archival agencies that have a vested interest and responsibility for management and distribution of such data.

3.1.4 EOSDIS Elements

NASA is implementing EOSDIS using a distributed, open system architecture. This approach allows for the distribution of EOSDIS elements to various locations to take advantage of institutional capabilities and areas of science expertise. Although EOSDIS is physically distributed, it appears as a single logical entity to the users.

The EOSDIS performs five major functions:

a. Spacecraft command and control,
b. Data capture and level 0 processing,
c. Science data processing, archiving, and distribution,
d. Communications and systems management, and
e. Data communications.

The EOSDIS elements that perform these functions are the EOSDIS Core System (ECS), the EOSDIS Distributed Active Archive Centers (DAACs), EOSDIS Version 0, Science Computing Facilities (SCFs), the EOS Data and Operations System (EDOS), the EOSDIS Backbone Network (EBnet) and EOSDIS external network, and the EOSDIS ground stations. Figure 3.1.4-1 shows a high-level view of the EOSDIS reference architecture including these elements. This figure builds on the EOS mission general operations concept shown in Figure 2.6-1 by allocating the EGS functions to EOSDIS elements. There is an additional EOSDIS element; the EOSDIS Test System (ETS), not shown in the figure, which provides test data generation and simulation capabilities for the EGS elements during development, integration and test, and launch preparations.

3.1.4.1 EOSDIS Core System

The ECS provides the services and functionality to command and control the EOS spacecraft and instruments, process data from the EOS instruments, and manage and distribute EOS data products and other selected data sets. In addition to the EOS series of spacecraft and instruments, the ECS provides information management and data archive and distribution functions for other Earth science missions, including the Tropical Rainfall Measuring Mission (TRMM), Landsat 7, Pathfinder missions, instruments on spacecraft flown by international partners, and Earth Probe satellites.

The ECS consists of three segments defined to support three major operational areas: flight operations, science data processing, and communications and system management. These segments are briefly described in this section; the *ECS Operations Concept for the ECS Project* describes them in more detail.

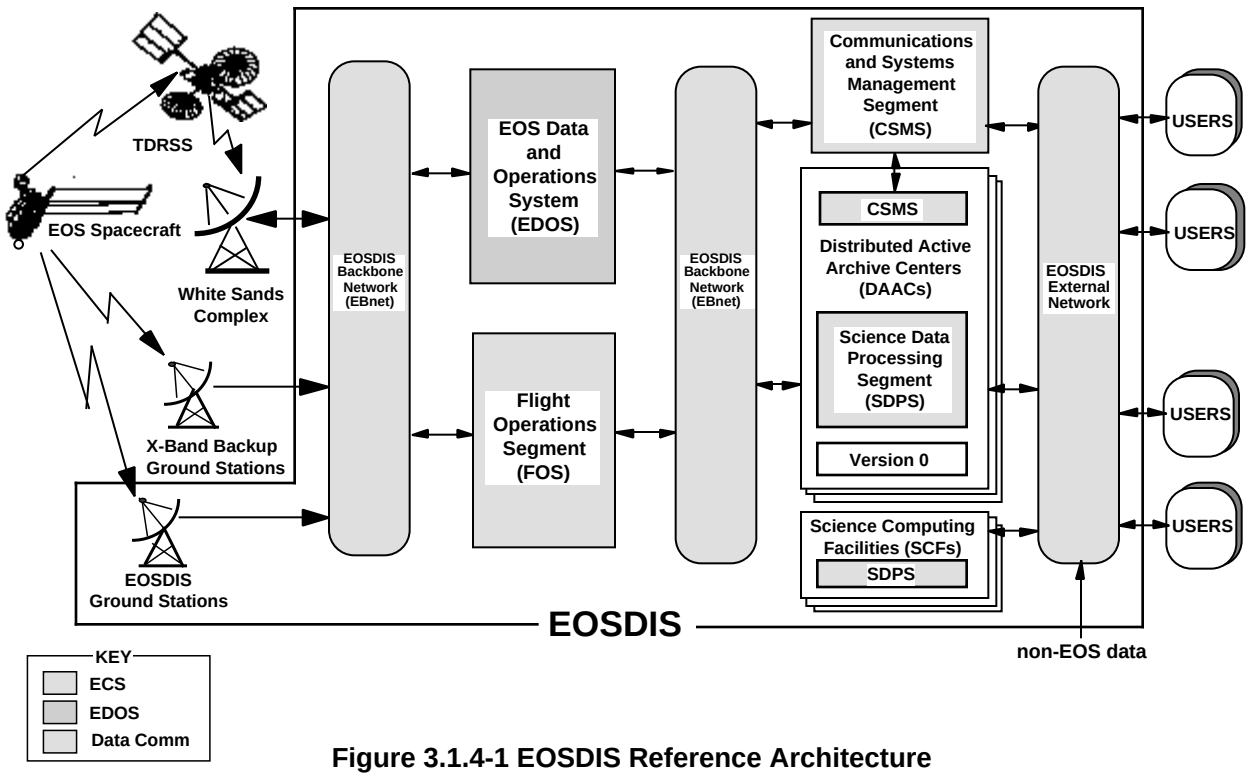

Figure 3.1.4-1 EOSDIS Reference Architecture

3.1.4.1.1 Flight Operations Segment

The Flight Operations Segment (FOS) manages and controls the EOS spacecraft and instruments. The FOS is responsible for mission planning, scheduling, control, monitoring, and analysis in support of mission operations for U.S. EOS spacecraft and instruments. It provides services to

a. Integrate schedules for spacecraft, instrument, and ground operations,

b. Manage the preplanned commands for the spacecraft and instruments,

c. Transmit command data, either real-time commands or command loads to EDOS for uplink to the spacecraft during each real-time contact,

d. Receive and process housekeeping data from EDOS,

e. Monitor overall mission performance and performance trends, maintain on-board software and spacecraft orbit, and manage the on-board systems,

f. Monitor and manage the configuration of the EOS Operations Center (EOC),

g. Manage the real-time interfaces with the Network Control Center (NCC) and EDOS, and with other ground stations, as applicable,

h. Maintain and update the project data base and FOS history log, and

i. Provide character-based and graphical display interfaces for FOS operators interacting with the other FOS services.

The FOS consists of two elements, the EOC and Instrument Support Terminals (ISTs). The EOC focuses on the command and control of the EOS flight segment and the interaction it has with the ECS ground operations. An IST connects a principal investigator (PI) or team leader (TL) at a remote facility to the EOC in support of instrument control and monitoring. ECS provided instrument support toolkits running on their remote terminals enable PIs and TLs to participate in planning, scheduling, commanding, and monitoring their instruments from remote sites.

3.1.4.1.2 Science Data Processing Segment

The Science Data Processing Segment (SDPS) provides for the generation and maintenance of EOS science data products for distribution to users. It provides the science community with the infrastructure to access EOS science data and with products resulting from research activities that utilize these data. The SDPS is a distributed system located at the DAACs and the SCFs. It provides services to

a. Receive, process, archive, and manage all data from EOS instruments and NASA flight missions, other selected remote sensing data, and their associated data products,

b. Receive, archive, and manage ancillary data required by EOSDIS algorithms,

c. Receive, archive, and manage correlative data,

d. Provide users access to all Earth science data held by the EOSDIS and to the data products resulting from research using these data,

e. Promote effective utilization of data for research in support of MTPE goals, and

f. Facilitate the development, experimental use, and community acceptance of new and improved algorithms.

3.1.4.1.3 Communications and System Management Segment

The Communications and System Management Segment (CSMS) provides for the interconnection of users and service providers, transfer of information between the ECS and many EOSDIS components, and status monitoring and coordination of EOSDIS components. It supports interfaces with the FOS and the SDPS to provide ECS operations, management, and maintenance personnel access to CSMS management services. These interfaces support a wide range of status reporting, operations coordination, and administrative and maintenance services. The CSMS provides services to

a. Generate high level ground event schedules,

b. Manage the configuration of all elements of the ECS and support configuration management of EOSDIS elements,

c. Monitor and evaluate site and element performance and performance trends,

d. Locate, identify, and isolate fault conditions, and identify corrective actions,

e. Manage security for all ECS elements and exchange security information across EOSDIS elements,

f. Perform security, data, and user audits; and maintain end-to-end data accountability, financial services, and resource utilization and cost information,

g. Establish and maintain user, facility, and system profiles, and

h. Generate a wide range of operational and administrative reports.

The system-level CSMS functions are located at the System Monitoring and Coordination Center (SMC). The SMC provides the capabilities necessary to manage ECS resources, at the ECS site level and for EOSDIS system-wide resources. The CSMS supports the FOS and the SDPS with physical network connectivity for their workstations, servers, and peripheral components. CSMS also provides local system management services at the DAACs and the EOC for use in managing the ECS provided capability, and exchanges status information with other EOSDIS elements to maintain a current system-wide view of EGS operational status.

3.1.4.2 Distributed Active Archive Centers

The DAACs provide facilities and operations for the production, archive, and distribution of EOS science data products. The DAACs are custodians of EOS mission data and other Earth science data and ensure these data are accessible to authorized users. DAACs receive level 0 data from EDOS, the Sensor Data Processing Facility (SDPF), and selected ground stations. DAACs also exchange production planning information with data centers that are part of MTPE but external to the EOS Program, and receive data from these data centers in the form of level 0, ancillary, or processed data sets and the associated metadata. The ECS supports the DAACs by providing SDPS components at their sites. SDPS provides the DAACs the operational interfaces required for management and control of algorithm integration and test, science product generation, data archiving and distribution, and user support services. DAACs provide data and information services, including comprehensive user support, to their users. These users include each DAACs specific discipline-oriented user community, the broader interdisciplinary global change community supported by all DAACs collectively, and NASA-sponsored EOS investigators. NASA-sponsored investigators develop science software for production use at the DAACs, and in some cases provide products generated at their own sites to the DAACs for archive and distribution to other users.

3.1.4.3 EOSDIS Version 0

The first version of EOSDIS, designated Version 0 (V0), is a working prototype which incorporates some operational elements. The development of V0 began in 1991 as a collaborative effort between the ESDIS Project, the DAACs, and the NOAA Satellite Active Archive, with the goal of improving the access to existing Earth science data held at the institutions that were designated DAACs. Several of these institutions had data systems that were developed independently, and were serving user communities in specific Earth science disciplines. These systems constituted the operating elements which were improved in their data holdings and levels of service to users during the development of V0, and incorporated in V0 in order to provide non-interrupted service to the science community. The data sets supported by the DAACs, levels of service provided for each dataset, and plans for the near future are documented in the *Science Data Plan*, which is updated yearly by NASA.

The working prototype in VO provides an Earth system science view across all DAACs, and permits searching and ordering their data holdings through a single session regardless of where the data are held. It interconnects existing Earth science data systems via electronic networks, interoperable catalogs, and common data distribution procedures to provide better access to existing and pre-EOS data. Due to the heterogeneity of the existing Earth science data systems at the DAACs, this is a good prototype for the logically distributed architecture intended for EOSDIS. In the development of V0, the key areas of emphasis were: developing collaborative relationships among the participating institutions, populating the databases and their inventories with datasets as prioritized by the user community, demonstrating distributed information management, benefiting from the wealth of experience gained in building these systems during the past decade, and applying the lessons learned to the subsequent versions of EOSDIS. V0 became operational in August 1994.

Concurrent with the development of V0, NOAA and NASA started a parallel effort to produce new data. This effort is called the Pathfinder data set development. The Pathfinder effort will improve access to particular data sets, and produce new products developed by community consensus algorithms. V0 provides access to the NOAA/NASA Pathfinder data sets, which will be archived and managed by the DAACs.

3.1.4.4 Science Computing Facilities

Science Computing Facilities (SCFs) provide the DAACs with science data processing software, quality assessment procedures, calibration parameters, and instrument data quality assessments, to support DAAC operations processing. The SCFs are computing facilities used by EOS investigators and located at science investigator sites. SCFs, which range from individual workstations to supercomputers, are used to develop and maintain science software and models for the generation of standard and special products; produce data sets; assess the quality of data, data products, and processing algorithms; and conduct scientific investigations with EOS and other Earth science data. The investigators at SCFs access instrument data at the DAACs and receive science data products. They provide high-order data products, instrument calibration data, product quality analysis results, science data processing software, and science research results to the DAACs. The interfaces and algorithm toolkits necessary to support these activities are provided by the ECS. Certain SCFs, collocated with investigators responsible for standard products, are designated Quality Control (QC) SCFs. QC SCFs perform scientific quality control of the data products.

3.1.4.5 EOS Data and Operations System

The EDOS provides capabilities for handling EOS spacecraft data compatible with the applicable Consultative Committee for Space Data Systems (CCSDS) recommendations. EDOS performs forward-link processing of command data, return-link processing of science and housekeeping data from the spacecraft and instruments, processes telemetry to generate level 0 products, and maintains a backup archive of level 0 products. These services are briefly described in this section; the *EDOS Operations Concept* describes them in more detail.

3.1.4.5.1 Return and Forward Link Processing

EDOS return and forward link processing services provide for the receipt, capture, processing, and transfer of all EOS digital data that conform to the applicable CCSDS communications services. Services include forward link real-time processing, return link real-time processing, data capture, rate buffering, and playback processing. All services include data quality assurance and accounting.

3.1.4.5.2 Production Data Handling

EDOS production data handling services are provided for mission data received from the EDOS return link service. Two services are provided, production data processing and expedited data processing.

Production data processing is the process by which packets from one or more TDRS service sessions (TSSs) are sorted by applications process identifier (APID), forward-ordered by sequence counter, and quality-checked. A production data set (PDS) is generated by deleting redundant and previously processed packets and adding quality and accounting summary information.

Expedited data processing is similar to production data processing, with the following exceptions. The content of the output expedited data set (EDS) is limited to either all packets received for a single APID during one TSS, or all packets in one TSS in which the expedite flag is set in the data packet secondary header. Redundant packets within an EDS are removed. However, since EDS processing focuses on a single TSS and does not take into account any data that arrived in a previous TSS, redundant packets between service sessions are not removed. Therefore, two EDSs could contain redundant data. The packets contained in an EDS are included in production data processing for the corresponding TSSs. The normal volume of expedited data processing is limited to a small percentage of all return link data received over a 24-hour period.

3.1.4.5.3 Data Archive

The EDOS data archive service provides a long-term storage capability as a backup to the DAAC archives for level 0 data. The production data sets generated by EDOS are recorded and stored for the life of EOS plus three years. Retrieved data sets, together with associated quality and accounting information, are delivered to the requesting DAAC as archive data sets. The data archive service can recover lost or damaged production data sets by requesting replacement data from the primary (DAAC) archive.

3.1.4.6 EOSDIS Backbone Network and EOSDIS External Network

The EBnet and EOSDIS external network provides wide-area communication circuits and facilities between and among various EGS elements, to support mission operations and to transport mission

data between EGS elements. The networks are responsible for transporting spacecraft command and control data and science data nationwide on a continuous basis, 24 hours a day, 7 days a week

Real-time data includes mission-critical data related to the health and safety of on-orbit space systems as well as pre-launch testing and launch support. These data include spacecraft and instrument command and control data, telemetry from the spacecraft and instruments, and mission operations data such as schedules, orbit and attitude data, and status information.

Science information includes mission science data collected from the spacecraft instruments, and various levels of processed science data including expedited data sets, production data sets, and rate-buffered science data

In addition to providing the wide-area communications through common carrier circuits for internal EOSDIS communications, EBnet serves as the interface to other systems such as DAACs, users, and the NASA science internet (NSI). EBnet also includes Exchange Local Area Networks (LANs) which provide communications between the Wide Area Network and site-specific LANs.

EBnet and external network capabilities are described in more detail in *[document citations to be supplied]* .

3.1.4.7 EOSDIS Test System

The ETS provides an early source of CCSDS formatted data during EOSDIS development and a variety of simulation and test support functions to verify EOSDIS elements, interfaces, and capabilities throughout the system life cycle.

The ETS can simulate EOSDIS systems, other EGS elements, and EOS spacecraft. It provides high-rate simulation functions up to 150 megabits per second to mimic the Ku-band science data stream input to EDOS and the corresponding EDOS output products, and low-rate simulation functions to mimic the generation and processing of S-band telemetry and spacecraft commands. The ETS also simulates the operations management data in administrative messages required to test EOSDIS mission operations and system management functions.

ETS capabilities are described in more detail in the *EOSDIS Test System (ETS) Operations Concept.*

3.1.4.8 EOSDIS Ground Stations

The EOSDIS ground stations provide the primary space to ground communications services between the EOS spacecraft (except AM-1) and the EOSDIS. The EOSDIS ground stations comprise the Radio Frequency (RF) ground terminal, the EDOS ground station interface, and the EBnet telecommunication system. The RF ground terminal provides space to ground link communications channels for receipt of high-rate science data, receipt of spacecraft telemetry data and transmission of spacecraft commands for two EOS spacecraft simultaneously, including X-Band and S-Band capabilities. The EDOS ground station interface monitors and captures the high-rate science data and transfers captured data to the EDOS level 0 processing facility at GSFC. The EBnet telecommunication system consists of equipment to establish the connection to leased telecommunication lines.

3.2 Institutional Facilities

3.2.1 Institutional Facilities Description

As described in earlier sections, the EOSDIS interacts with a number of systems, facilities, networks, and organizations to accomplish the EOS mission. Institutional facilities are not dedicated to any one mission, but provide a wide range of services to many different missions simultaneously. This section describes the major data flows between EOSDIS and the external institutional facilities providing services to the EOS missions; these interfaces are represented in the high-level EGS architectural overview shown in Figure 3-1.

3.2.2 Institutional Facility Interfaces

Each interface is discussed by introducing the external institutional element and briefly describing the major data flows between the element and EOSDIS. Additional details describing the degree of services provided and types of data exchanged can be found in the appropriate facility documentation and corresponding interface control documents.

3.2.2.1 Flight Dynamics

Flight Dynamics provides navigational support, predicted orbit, and attitude information for EOS spacecraft. Flight Dynamics receives housekeeping telemetry parameters from the EOC, supports operational orbit determination, and provides orbit predictions and maneuver parameters to the EOC, along with attitude determination and attitude control evaluation of EOS spacecraft.

3.2.2.2 Nascom

Nascom provides certain communications services to EOSDIS independent of EBnet from prior arrangements or because of the special nature or attributes of the service. This includes, for example, the communications between the White Sands Complex and the Network Control Center to schedule and control the resources of the Space Network (SN).

3.2.2.3 Space Network

The SN provides the forward and return link communications between AM-1 and EDOS. The NCC provides schedules to the EOC for TDRS contacts for nominal operations. The NCC also provides schedules for other ground stations for EOS spacecraft contingency support.

3.2.2.4 Ground Network, Deep Space Network, Wallops Orbital Tracking Station

The GN, DSN, and WOTS provide low-rate S-Band contingency and/or emergency command and telemetry communications support for EOS spacecraft. These stations provide spacecraft and instrument housekeeping data to EDOS and the EOC, and receive command data from EDOS and EOC for uplink to EOS spacecraft.

3.2.2.5 X-Band Backup Ground Stations

Two ground stations, located at high latitudes, will provide backup high-rate X-Band communications for the AM-1 spacecraft playback science data in the event of a failure of the on-board TDRSS communications system.

3.3 Participating Programs

3.3.1 Participating Program Description

As described in earlier sections, the EOSDIS interacts with a number of systems, facilities, networks, and organizations to accomplish the EOS mission. Certain external programs participate in the MTPE/EOS program by exchanging data and/or services with the EOSDIS. This section describes the major data flows between EOSDIS and the program facilities participating in the EOS program; these interfaces are represented in the high-level EGS architectural overview shown in Figure 3-1.

3.3.2 Participating Program Interfaces

Each interface is discussed by introducing the external participating element and briefly describing the major data flows between the element and EOSDIS. Additional details describing services provided (if any) and types of data exchanged can be found in the appropriate participating element documentation and corresponding interface control documents.

3.3.2.1 EOS Spacecraft Ground Support

Several NASA and spacecraft manufacturer facilities external to EOSDIS provide spacecraft development and launch support. Spacecraft integration and test facilities exchange engineering data between the space system (spacecraft and instruments) and the EOSDIS. Launch support is provided by a spacecraft launch facility, such as the spacecraft and launch facility at Vandenberg Air Force Base for AM-1. The launch facility participates in pre-launch engineering tests, receives commands and data from EOSDIS for transmission to the spacecraft, and provides mission health and safety telemetry to EOSDIS during launch and initial ascent.

3.3.2.2 International Partner Facilities

International partners such as the European Space Agency, Japanese organizations, and the Canadian Space Agency provide spacecraft and instrument payloads, data acquisition, processing, archiving, and distribution capabilities to EOSDIS. The IP instrument control centers (ICCs) exchange data with the EOC to support planning and scheduling, commanding, and instrument operations for IP instruments. IP ground systems provide data products to DAACs. The ASTER ground data system receives ASTER instrument data from EDOS.

3.3.2.3 Affiliated Data Centers and Other Data Centers

Affiliated data centers (ADCs) and other data centers (ODCs) coordinate data availability with the DAACs and provide selected science data products to the DAACs. EOSDIS elements access these data to satisfy user queries and as correlative data for standard products generated by EOSDIS. A NOAA facility receives CERES instrument data directly from EDOS.

The SDPF at GSFC processes TRMM science data to level 0 and provides selected instrument data to DAACs and other instrument data to the TRMM Science Data Information System (TSDIS) for higher-order processing. The TSDIS provides TRMM data products and metadata to DAACs for archive, distribution, and further processing.

The Landsat 7 Processing System processes Landsat 7 instrument data to level 0R and provides data products and metadata to a DAAC for archive and distribution.

3.3.2.4 User Facilities

Program-sponsored investigators participate in specifying the data to be collected, operating the instruments, and analyzing the science data and data products. Investigators generally interact with EOSDIS through facilities such as SCFs, ISTs, and DAACs.

Public users access the EOSDIS via external networks. These users request data and information and receive data products from the EOSDIS. Public users may also acquire tools from EOSDIS to support search, data order, and data manipulation functions.

3.3.2.5 NASA Science Internet

The NASA Science Internet (NSI) is an open communications network that serves the needs of NASA's diverse science and research community worldwide. The NSI provides connectivity between the AM-1 instrument support terminals (ISTs) and the EOC, and between DAACs and instrument teams QC SCFs. It provides data communications services between EOSDIS and user facilities, ADCs and ODCs, IP data centers, other data sources, and other projects, and provides DAAC connectivity to the internet for all users.

3.4 EGS Implementation Approach and Evolution

The EGS is being developed in an evolutionary manner with extensive input from, and testing by, the science community. This approach is a step-by-step process that allows the graceful transition of the system from the existing diverse Earth science data and information systems to the EGS configuration. The system will be operational before the launch of the first EOS spacecraft and will thereafter continue to evolve in response to scientific research needs.

As a major component of the EGS, the EOSDIS is designed to accommodate technology insertion and functional expansion. During implementation of each version the "build to" specification includes provisions for accommodating the growth needs of future releases. The development approach is structured to ensure that the design also incorporates lessons learned from user experience with existing NASA data sets, as well as the results of prototyping efforts for the various EOSDIS elements. Prototyping results and user feedback will continue to be incorporated into new versions of EOSDIS following successful demonstration and acceptance by the program.

Implementation of new EOSDIS versions is planned to have minimal disruption to current EGS operations. The ESDIS Project level 2 requirements include overall system architecture requirements that define an architectural environment and specify incorporation of technologies that facilitate this process. EOSDIS will be built incrementally in multiple versions. The evolution of EOSDIS begins with Version 0 (V0) and will continue with subsequent versions. Each version will provide mission-specific operational capabilities; each subsequent version will provide an expanded increment of those capabilities to support future missions.

The first version of EOSDIS, designated Version 0 (V0), is a working prototype incorporating some operational elements. The development of V0 was started in January, 1991 with the goal of improving the access to existing Earth science data held at institutions that were designated DAACs. It interconnects existing Earth science data systems via electronic networks, interoperable catalogs, and common data distribution procedures to provide better access to existing and pre-EOS data. Beginning with existing, heterogeneous Earth science data systems, V0 will evolve toward the full EOSDIS by taking maximum advantage of existing experience and ensuring that no disruption in current user services occurs. Through the interconnection of the existing systems,

V0 serves as a functional prototype of selected key EOSDIS services. As a prototype, it does not have all the capabilities, fault tolerance, or reliability of the later versions; however, EOSDIS V0 supports use by the scientific community in day-to-day research activities. Such use tests existing services to determine the additional or alternative capabilities required of the full EOSDIS. V0 became operational in August, 1994.

EOSDIS Version 1 (V1) is planned for release in January, 1997. It will provide support for the TRMM mission that will include: product generation from the EOS instruments (CERES and LIS) and archival and distribution of data products resulting from TRMM instruments. V1 also will support the early testing of EOS AM-1 spacecraft command and control, and the testing of interfaces between the FOS, EDOS, EBnet, and the NASA institutional capabilities supporting EOSDIS. V1 will reflect user feedback from V0 to enhance operations in all areas, with special emphasis on user sensitive areas. For providing users with uninterrupted access to data and information, V0 and V1 will operate in parallel until the data from V0 are migrated into the V1 system and the V0 hardware components become obsolete. During this period, the two systems will interoperate. V1 will address technology and data volume issues and provide increased capacity and functionality over V0.

EOSDIS Version 2 (V2) is planned for release in October, 1997. V2 will enhance V1 functionality and expand capability to the level needed to support AM-1 mission operations. V2 will also support Landsat 7 data archiving and distribution.

Subsequent versions of EOSDIS will supplement capacity and services as required by EOS spacecraft launches. EOSDIS capabilities will evolve based on continuing evaluation by the research community, and technology will be enhanced as the need arises.

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